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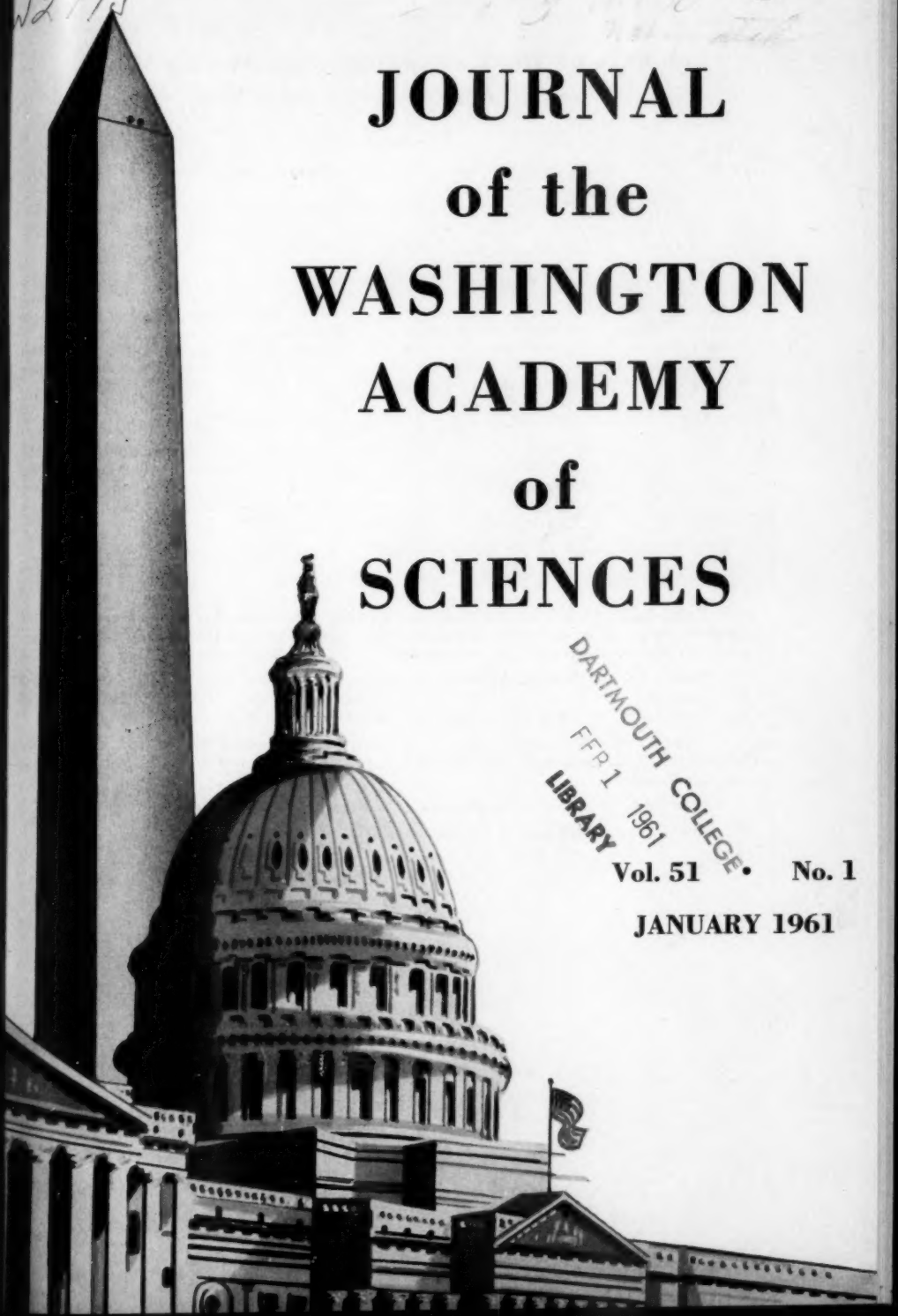
JOURNAL of the WASHINGTON ACADEMY of SCIENCES



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Vol. 51 • No. 1

JANUARY 1961

JOURNAL OF THE WASHINGTON ACADEMY OF SCIENCES

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This Journal, the official organ of the Washington Academy of Sciences, publishes: (1) historical articles, critical reviews, and scholarly scientific articles. (2) notices of meetings and proceedings of meetings of the Academy and its affiliated societies, and (3) regional news items, including personal news, of interest to the entire membership. The Journal appears eight times a year in January to May and October to December.

Subscription rate; $7.50 per yr. (U.S.), $1.00 per copy. Foreign postage extra.

Subscription Orders or requests for back numbers or volumes of the Journal, or copies of the Proceedings, should be sent to the Washington Academy of Sciences, 1530 P St., N.W., Washington, D.C. Remittances should be made payable to "Washington Academy of Sciences".

Claims for missing numbers will not be allowed if received more than 60 days after date of mailing plus time normally required for postal delivery and claim. No claims will be allowed because of failure to notify the Circulation Manager of a change of address.

Changes of address should be sent promptly to the Academy Office, 1530 P St., N.W., Washington, D. C. Such notification should include both old and new addresses and postal zone number, if any.

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Second class postage paid at Washington, D. C.

Philip Hauge Abelson

President, Washington Academy of Sciences, 1961

When Phil Abelson was elected in 1959 to the National Academy of Sciences, one of the highest honors that can come to an American scientist, he could have affiliated himself with any one of seven sections of the Academy, because he has made distinguished contributions to Biochemistry, Chemistry, Engineering, Geology, Geophysics, Microbiology, and Physics. Perhaps the presence of his friend Bill Rubey (Past President of the Washington Academy) in the Section on Geology caused Phil to register as a geologist. In Who's Who in America he calls himself a physical chemist, but the only proper designation for Phil Abelson is "scientist," for he has set no limit to his inquiries in natural science.

Phil is not unusual in his curiosity about natural phenomena; many of us are interested in all sciences from anthropology to zoology. Indeed, a function of the Washington Academy is to encourage broad interest in science and interdisciplinary connections and relationships among the recognized branches of science. Phil is unique, however, in his successful pursuit of knowledge through personal research in widely different fields. I used to think of the late Forest Ray Moulton as the modern Benjamin Franklin, but now I think that honor should go to Phil. Let us examine his remarkable career.

Phil was born in Tacoma, Washington, in 1913, a son of a civil engineer. In his early teens he learned to help his father in surveying and was soon able to do the work of a skilled surveyor. Opportunity and responsibility came when he was permitted to substitute for a surveyor who was absent from an important job because of illness. The boy made good and at 17 became Tacoma's City Surveyor. Thus he earned money to pay some of his expenses at Washington State University (then the State College of Washington). He majored in the physical sciences and graduated in three years when he was only 20. He remained in Pullman for two more years for a master's degree and served as an assistant in physics. During this period he became acquainted with the work of the late Ernest O. Lawrence at the University of California in Berkeley and decided to work for his Ph.D. in nuclear physics with Lawrence. His famous Radiation Laboratory was new at that time and so was the cyclotron. Phil was in on the ground floor of the great developments in nuclear physics. His doctor's dissertation (1939) described the first identification of many important products of uranium fission.

While at Berkeley Phil met and married a young medical student, who must have caused him to think about the biological effects of ionizing radiations. In 1939 he joined the staff of the Carnegie Institution's Department of Terrestrial Magnetism here in Washington, a research institution that is not at all restricted to the study of terrestrial magnetism. He collaborated with Edwin M. McMillan, of the Radiation Laboratory, in the discovery of neptunium and in the determination of its chemical properties. These investigations suggested the early process used at Hanford for the manufacture of plutonium. During World War II he was, of course, a key figure in the Manhattan Project. Attached to the Naval Research Laboratory, he developed the liquid thermal diffusion method for the enrichment of uranium 235. Under his general supervision a plant employing that method was designed and constructed at Oak Ridge and incorporated into the over-all facility used in the production of the first atomic bomb. For this work he was awarded the Navy's Distinguished Civilian Service Medal. About two years ago there appeared in a local newspaper a feature story about Phil as the real father of our first nuclear-powered submarine, in the sense that he was the first to show how to use atomic energy for propulsion of undersea vessels. He won't talk about it, but he assured me that the story I read was substantially correct. Admiral Rickover, whose name is always associated with our atomic submarines, was the leader of the developmental phase of the work.

At the end of World War II we find Phil one of the atomic scientists who had helped to win the war for America. He had been well compensated and honored for his work. What would you expect him to do next? I would have expected him to advance to a position of greater authority in nuclear physics, and perhaps to promote the peaceful applications of atomic energy, which he must have foreseen. I would have expected him also to join in the public alarm sounded by the Atomic Scientists about the need for proper control of atomic energy. He did neither; instead he searched his own mind and conscience and quietly decided that he wanted to resume learning—to do basic research himself. Strange to say, he turned to biology where he could apply chemical and physical tools to the education of fundamental questions about living matter. The opportunity to do such work was provided by Merle A. Tuve, a member of the Washington Academy and of the National Academy, who had become Director of the Department of Terrestrial Magnetism of the Carnegie Institution. Thus Phil returned to the laboratory from which the war had taken him, rejecting greater salaries that he might have obtained elsewhere. He became Chairman of the Biophysics Section of the Department, which was a pioneer in the utilization of radioactive tracers in biological research. The group worked out many of the processes of synthesis of the principal amino acids and published a widely-used monograph on the subject. In 1950 while in this position Phil received the Annual Award of the Washington Academy of Sciences, in the Physical Sciences; in 1962 he will present this same award and others to young men and women whose research or teaching has been outstanding.

In 1953 Phil carried his biological interests into another laboratory of the Carnegie Institution. Appointed Director of the Geophysical Laboratory, he initiated investigations in what might be called biochemical evolution. Previously, comparative studies of plant and animal fossils had been only morphological. Phil saw the possibility of making chemical studies on traces of organic matter that he found, for example, in fossil shells. By paper chromatography he was able to isolate amino acids from fossils as old as 450 million years!

It would be natural for Director Abelson to succumb scientifically to the growing demands upon him as an administrator, a lecturer, a chairman or member of committees and editor. But he resists encroachment upon his time for thinking about his own research and for working at it with his own hands. Most recently he has been engaged with Thomas C. Hoering of his Laboratory in studying separation of carbon isotopes occurring during photosynthesis. By examining C^{13}/C^{12} in amino acids from organisms grown in the laboratory they have discovered unexpected isotope fractionations. How can he do such research and also do more than his share as a citizen of the Washington scientific community? It takes a special environment, special ability and dedication, and an unusual design for living to be an Abelson. He literally lives with his work at his Laboratory and goes to his home in Philadelphia to spend week ends and holidays with his wife (a practising physician) and daughter. During the working week he is able to allocate his time so as to concentrate exclusively on his research for periods long enough for effective thought and action.

Phil's non-research activities for science are impressive. His work as co-editor of the Journal of Geophysical Research must be very time consuming. I know that he has had much to do with the recent rapid growth of this highly technical journal, which is certainly the world's leading publication in its field. His interest in the medical sciences is not surprising if one knows that Mrs. Abelson is a physician. For eight years he served as chairman of an NAS-NRC committee on cataracts of the eye caused by ionizing radiations. On another committee he concerned himself with substances that might be used to expand the volume of usable blood plasma. From 1956 to 1959 he was a member of the Biophysical Study Section of the National Institutes of Health and now serves on the Board of Scientific Counselors of the National Institute of Arthritis and Metabolic Diseases. On the physical side, he is a member of the General Advisory Committee of the Atomic Energy Commission and a member of its Plowshare Advisory Committee, i.e., on peaceful applications of atomic explosions, such as were described to the Washington Academy by Dr. Edward Teller at a meeting of the Academy in 1959. He is a consultant to the National Aeronautics and Space Agency. His membership in a dozen or so major scientific societies also reflects the extraordinary diversity of his interest. His preparation for service as President of the Washington Academy includes not only the above experiences in the content and civics of science, but experiences in the affairs of the Academy itself. In 1957 he served as chairman of the Meetings Committee under Bill Rubey. As an elected member of the Board of Managers he was a faithful attendant at the monthly Board meetings and a participant in its deliberations. It was he who set in motion the chain of events that led to a radical change in character of the Journal of the Academy, a revolution that is now becoming an evolution.

Phil is a quiet, thoughtful person, with whom one cannot become quickly acquainted. Certainly I do not know my subject as well as I should like to and probably not well enough for writing a profile that does him justice. I hope, however,

that my readers believe, as I do, that the Washington Academy is very fortunate to have acquired a share of his time. When he was elected a member of the Cosmos Club in 1953, his principal sponsors were two prominent physical scientists, Vannever Bush and L. R. Hafstad. The latter described Phil as a "most able scientist, possessing an exceptional originality, with many outstanding scientific accomplishments to his credit." Withal Phil is a modest, charming fellow with a flashing smile. I expect his "exceptional originality" to be applied to the Academy gently but effectively. ***Frank L. Campbell***

Science in Washington

SCIENTISTS IN THE NEWS

This column will present brief items concerning the activities of members of the Academy. Such items may include notices of talks given, important conferences or visits, promotions, awards, election to membership or office in scientific and technical societies, appointment to technical committees, civic activities, and marriages, births, and other family news. Formal contributors are being assigned for the systematic collection of news at institutions employing considerable numbers of Academy members (see list on masthead). However, for the bulk of the membership, we must rely on individuals to send us news concerning themselves, and their friends. Contributions may be addressed to ***Harold T. Cook, Associate Editor, U. S. Department of Agriculture, Agricultural Marketing Service, Room 3917 South Building, Washington 25, D. C.***

CARNEGIE INSTITUTION

H. W. Wells, Department of Terrestrial Magnetism, Carnegie Institution of Washington, is on leave of absence to serve at the U. S. Embassy, Rio de Janeiro, as Scientific Attache.

DAVID TAYLOR MODEL BASIN

Harry Polachek, Technical Director of the Applied Mathematics Laboratory at the David Taylor Model Basin, received the Distinguished Civilian Service Award on November 23. This honorary award, the highest that the Secretary of the Navy may confer on a civilian employee of the Navy, was given in recognition of Dr. Polachek's achievements in organizing and directing the Applied Mathematics Laboratory, in demonstrating the potential of high speed computers and in his contributions to scientific, technical and management fields such as nuclear design, advance programming systems, and analysis of acoustic signals. This has opened additional lines of research such as the automatic computation of ship lines and speeded the solution of a variety of problems and data reduction.

GEOLOGICAL SURVEY

Edwin W. Roedder gave a paper on "Primary fluid inclusions in sphalerite crystals from the OH vein, Creede, Colorado," and **Margaret D. Foster** gave a paper on "Fe_2O_3 in chlorites" at the meeting of the Geological Society of America and affiliated societies, Denver, Colorado, October 31 to November 2. **Arthur A. Baker, Helen M. Duncan, Joseph J. Fahey, George T. Faust, Jewell J. Glass and Marjorie Hooker** also attended the meetings. At these meetings Miss Marjorie Hooker was re-elected Treasurer of the Mineralogical Society of America and Dr. George T. Faust was re-elected Treasurer of the Geochemical Society.

Francis R. Fosberg has returned from a two months' trip to the Pacific, during which he participated in a symposium on "The Impact of early man on humid tropical vegetation," held under the auspices of Unesco at Goroka, in the interior of New Guinea. While in New Guinea, Dr. Frosberg made a study of the vegetation patterns and visited an island of the Great Barrier Reef on the Queensland coast. In company with C. G. Johnson, of the Military Geology Branch, D. I. Blumenstock, of the Weather Bureau, and Harald Rehder, of the National Museum, he also visited Jaluit Atoll, in the Marshall Islands, to study the course of recovery of the atoll from the effects of the 1958 typhoon Ophelia.

HOWARD UNIVERSITY

Lloyd N. Ferguson recently made talks on "The Direction of Enolization of 1,3-Diketones" at the University of Vermont; "Group Electronegativities in Organic Chemistry" at Norwich University; "Physicochemical Studies on the Sense of Taste" at St. Michael's College, "Multiple Careers for College Science Majors" and "Aromatic Character of Certain Ring Structures" at Middlebury College, under the ACS Visiting Scientists Program.

NATIONAL ACADEMY OF SCIENCES

Frank L. Campbell served as deputy foreman of the November District of Columbia Grand Jury from November 7, 1960 to January 10, 1961.

NATIONAL BUREAU OF STANDARDS

Arnold M. Bass is in London on a research assignment under the NBS training program. He is working with Dr. W. R. S. Garton in the Physics Department, Imperial College of Science and Technology, University of London until July 1961. Dr. Bass is working on vacuum ultraviolet spectra of diatomic molecules.

Academy members presenting papers at recent meetings included the following: **Alexander, S. N.,** "What's Ahead in ADP Equipment", American University, Institute on Electronics in Management, Washington, D. C., October 31; **Bennett, J. A.,** "What the Metallurgist is Doing About Fatigue," Washington Chapter, American Society for Metals, Washington, D. C., November 14; **Cook, R. K.,** and **Young, J. M.,** "Strange Sounds at Low Frequencies in the Atmosphere", Physics Seminar, University of Maryland, College Park, Maryland, November 8; **Cook, R. K.,** "Methods for Measuring Sound Transmission Loss", American Society for Testing Materials Symposium on Testing, Washington, D. C., November 15; **Frederikse, H. P. R.,** "Conduction in Rutile," Solid State Physics Group, Westinghouse Research Laboratories, Pittsburgh, Pennsylvania, November 7; **Harris, F. K.,** "The present Status of the Electrical Standards," American Institute of Electrical Engineers, New Haven, Connecticut, November 15; **Herzfeld, C. M.,** "Peaceful Uses of Atomic Energy," Institute for Religions and Social Studies, New York, N.Y., November 22; **McNish, A. G.,** "International Coordination of Standards," 1960 Middle Atlantic Conference for American Society for Quality Control, the Martin Company, Baltimore, Md., November 11; **McPherson, A. T.,** "Precision Measurement and National Security," Cumberland Section, American Society for Quality Control, Cumberland, Md., November 1; **Paffenbarger, G. C.,** "Denture Base Resins: Changes in Dimensions During Processing and in Service," Mid-Continental Dental Congress, St. Louis, Mo., October 30; **Posner, A. S.,** "Three Dimensional Chemistry," American Chemical Society Student Affiliate, University of Maryland, College Park, Md., November 16; **Rubin, R. J.,** "Classical Energy Transport in Disordered Lattices," American Physical Society, Chicago, Ill., November 25-26; **Scribner, B. F.,** "Spectroscopic Trace Analysis," Eastern Analytical Symposium, New York, N. Y., November 3; **Sweeney, W. T.,** "Properties of Resins Used in Dentistry," U. S. Army Central Dental Laboratory Commanders Conference, Washington, D. C., November 14-16; **Taylor, L. S.,** "Attending the meetings of the International Atomic Energy Agency on Basic Safety Standards of Radiation," Vienna, Austria, October 31-November 4; **Taylor, J. K.,** "Electroanalytical Chemistry", Chemistry Seminar, Kent State University, Kent, Ohio, November 2, and "High Precision Coulometric Titrations", Analytical Group, Cleveland Section, American Chemical Society, "Advancing the Profession of Chemistry" American Chemical Society, Dayton, Ohio, November 8, and "A Code of Ethics for Chemists," American Chemical Society, Philadelphia, Pennsylvania, November 17; **Youden, W. J.,** "What Happens When Different Laboratories Evaluate the Same Item?", Binghamton Section of the American Society for Quality Control, Binghamton, New York, November 14.

NAVAL RESEARCH LABORATORY

George R. Irwin and **J. A. Kies** presented a paper entitled "Review of Fracture Toughness Measurements" at the Twentieth Meeting of the ANC-5 Panel on MIL-HDBK-5 Strength of Metal Aircraft Elements, in Los Angeles, California on November 15-17.

Dr. Irwin also gave a series of lectures on "Materials and Missiles for Spacecraft" at the University of California in Los Angeles, December 1-6.

Horace M. Trent and Betty E. Anderson compiled a "Glossary of Terms Commonly Used in Acoustics." This pamphlet was prepared for the American Institute of Physics and is available from them on request.

Dr. Trent was one of seven panelists at a conference October 19 in San Francisco for science writers. This conference was sponsored by the American Institute of Physics with financial backing from the National Science Foundation. He spoke on "Mechanical Shock and Vibration."

He also gave lectures to high school science and mathematics teachers from the local area at the Naval Research Laboratory November 19 and 21.

OFFICE OF NAVAL RESEARCH

J. Samuel Smart left the Physics Branch August 19 to take a position with the IBM Research Center, P.O. Box 218, Yorktown Heights, N. Y.

USDA, BELTSVILLE

R. I. Sailer, until recently Assistant Chief of Insect Identification and Parasite Introduction Research Branch, of the Entomology Research Division, left on November 25 to take charge of the European Counterpest Laboratory, Paris, France. The Laboratory is headquarters for the Entomology Research Division Foreign Parasite Investigations. Discovery and introduction into the United States of parasites or predators that attack crop pests is the primary objective of the Laboratory.

Paul W. Oman, Chief, Insect Identification and Parasite Introduction Research Branch, Entomology Research Division, is serving as director of the U. S. Department of Agriculture, Far Eastern Regional Research Office in New Delhi, India, to develop and coordinate the agricultural research grant program in Asiatic countries conducted with PL 480 funds.

USDA, WASHINGTON

Hazel K. Stiebeling presented a paper on "Contributions of Insecticides to the American Home (including nutrition and Household Pests)" at a symposium on Contributions of Insecticides to Human Welfare, at the Entomological Society of America meeting in Atlantic City, November 28.

Justus C. Ward served on a panel on the Pesticide Residue Problem at the Eastern Branch of the Entomological Society of America meeting at New York City, October 14. On November 18, he spoke before the general session of the Oregon State Horticultural Society, Corvallis, Oregon, on "Historical Notes on Pesticide Controls," and before the Apple and Pear Section on "Pesticide Residues and Regulations."

Elbert L. Little, Jr., U. S. Forest Service, attended the First Mexican Botanical Congress, in Mexico City, October 24-26.

UNCLASSIFIED

Lloyd V. Berkner has resigned as president of Associated Universities, Inc., New York, to accept the presidency of the Graduate Research Center, Dallas, Texas. Dr. Berkner has headed the Associated Universities, Inc., for the last 10 years.

DEATHS

George Willis Stose died January 30, 1960, after a long illness. He received the B.S. degree in civil engineering from Massachusetts Institute of Technology in 1893 and then spent 1 year in graduate work in geology. He joined the U.S. Geological Survey in 1894 and attained the rank of Chief Scientist (Geologist). Dr. Stose was retired in 1941 at the age of 72 years, his employment having been extended 2 years by Presidential order. He was called back to make wartime studies of manganese deposits in Alabama and Virginia from July 1949 to February 1953. For 44 years he was Editor of Geologic Maps, in charge of the Section of Geologic Maps. The geologic map of the United States printed in 1932 was compiled under his direction. Dr. Stose's own field studies were devoted largely to the geology of the Appalachians. His bibliography contains over 100 publications.

AFFILIATED SOCIETIES

American Institute of Electrical Engineers, Washington Section

Considerable progress is reported in organizing five technical groups or division within the Section, in the areas of: instrumentation and telemetry; communications; transportation, industry and management; power; and science and electronics. At least one of these divisions has held two meetings already, and others are planned.

American Society of Civil Engineers, National Capital Section

Annual Fall Awards to Outstanding Students were made, on December 13, to Howard T. Hill, George Washington Univ., Christopher L. Martin, Howard University, and Michael A. Czachor, Catholic University.

American Society of Mechanical Engineers, Washington Section

Mechanical engineering education for the remainder of the Twentieth Century was appraised by Paul F. Chenea, of Purdue University, at the December 8 meeting. This analysis tried, as so many are doing, to examine whether changes in curricula are needed, the relation of schools to industry, and the interplay of teaching duties and research effort.

Chemical Society of Washington

Principal business at the November 29 meeting of the board of managers concerned how best to arouse and continue member interest, a problem earlier studied by an *ad hoc* committee of the board. It was generally considered unwise to hold business sessions at regular meetings featuring outside speakers, but that much might be accomplished by inviting members to attend Board meetings, by opening committee meetings to the membership at large, by establishing additional committees with the avowed objective of furthering entertainment, organizing special events, and extending welcome to new and transfer members. A possible way to accommodate members' interests in specialized areas of chemistry would be to form topical groups or subsections within the society.

Geological Society of Washington

In addition to the regular program at the November 9 meeting, Frank C. Whitmore, Jr. discussed the discovery of an upper Miocene whale near Hampton, Va., perhaps the finest fossil of its kind that has thus far been found on the Atlantic Coastal Plain. It is also of special interest because, previously, whales of this type were thought to be of Pliocene age.

Philosophical Society of Washington

The Ninth Annual Christmas Lectures this year presented George W. Beadle, of the California Institute of Technology, on the general topic "Genes as Living Molecules." These lectures are primarily for high school and advanced junior

high school students, who are admitted free upon presentation of tickets distributed by the Society.

CALENDAR OF EVENTS

Beginning with this issue, meetings of affiliated societies scheduled for the month of publication of the Journal will be noted chronologically. When available to us at the time of writing, the nature of the program, the place, and the time will be noted. Entries which do not include all of this information indicate, in most instances, a regularly scheduled meeting of the society—unless our correspondents notify us to the contrary, we assume that the date and location of such meetings remain unchanged from month to month. Every attempt will be made during 1961 to have the Journal appear at the beginning of each month. (January excepted).

January 16—Acoustical Society of America, Washington, D.C. Chapter
Gallaudet College, 8:00 PM

Society of American Military Engineers, Washington Post
YWCA, 17th and K, N.W., 12:15 PM

January 18—Insecticide Society of Washington
Symons Hall, University of Maryland, 8:00 PM

Washington Society of Engineers
John Wesley Powell Auditorium, 22nd and Mass. Ave., N.W., 8:00 PM

January 19—Washington Academy of Sciences
John Wesley Powell Auditorium, 22nd and Mass. Ave., N.W.
Banquet and presentation of Academy Awards.

Society of American Foresters, Washington Section
YWCA, 17th and K, N.W., 6:30 PM

January 24—American Society of Civil Engineers, National Capital Section
YWCA, 17th and K, N.W., 12:00 noon

Society of American Bacteriologists, Washington Branch
Walter Reed Army Medical Center

January 26—American Society of Mechanical Engineers, Washington Section
John Coutinho, "Reliability," Pepco Auditorium, 10th and E, N.W., 8:00 PM

ACADEMY ACTIVITIES

The 454th meeting of the Academy will be the Annual Dinner Meeting, held January 19, 1960 at the John Wesley Powell Auditorium. Awards for Scientific Achievement will be presented by the President to the following recipients:

1. *Biological Sciences.* **Louis S. Baron,** Walter Reed Army Institute of Research.
2. *Engineering Sciences.* **Romald E. Bowles,** Diamond Ordnance Fuse Laboratory.
3. *Physical Sciences.* **Richard A. Ferrell,** University of Maryland.
4. *Mathematics.* **Philip J. Davis,** National Bureau of Standards.
5. *Teaching—High School Science.* **Mrs. Pauline Diamond,** Sherwood High School.
6. *Teaching—College and University Science.* **Karl F. Herzfeld,** Catholic University.

A full-length feature on the Awards program and the recipients will appear in the February issue of the *Journal.*

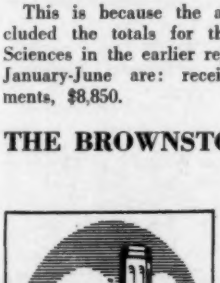
CORRECTION

Figures from the Treasurer's reports of Academy receipts and disbursements as printed on page 16 of the November 1960 issue of the Journal show larger totals for the year to June than to September.

This is because the author inadvertently included the totals for the Junior Academy of Sciences in the earlier report. Correct totals for January-June are: receipts, $9,605; disbursements, $8,850.

THE BROWNSTONE TOWER

FRANK L. CAPBELL



Looking south down the Potomac from the Brownstone Tower, one might with the help of a telescope locate the Engineer Research and Development Laboratories of the U. S. Army Corps of Engineers at Ft. Belvoir, Va. Just prior to writing this column, I drove down to the ERDL to see Clyde S. Barnhart, who is the entomologist in the Sanitary Sciences Branch (Richard P. Schmitt, in charge) of these Laboratories. He is responsible to W. Doyle Reed, an active member of the Washington Academy, for the development of equipment for pest control (rodents, insects, etc.) in the armed services, for the Corps of Engineers does this work for the Navy and Air Force as well as for the Army.

Dr. Barnhart was one of my students at the Ohio State University prior to World War II. He showed unusual imagination and proficiency in devising and constructing equipment for the rearing of insects and for experimentation with

them. Both the second world war and the Korean war so interfered with his career that he did not take his doctor's degree in entomology until 1958. Admittedly a Ph.D. was not necessary for engineering research, but he was determined to show that he could take his degree in insect morphology, and at last the time came when he was ready for placement in a position where his engineering talents could be given full sway.

What I now have to say about the work of Dr. Barnhart, whom I shall call Barney hereafter, will serve a dual purpose: (1) to inform the members of the Academy about some interesting work that might not otherwise come to their attention, and (2) to provide for the Membership Committee information about Barney that I hope will cause him to be elected to the Academy.

Soon after he came to ERDL, Barney concluded that the current pest control equipment was heavier and more expensive than was necessary. In view of the probability that future military operations will be air borne, it is really important that everything used by the military should be as light in weight as possible. Therefore he began to think about how to lighten and simplify the existing equipment.

First, he worked on a mosquito light trap, a device for attracting mosquitoes to an electric light and drawing them into a trap below by means of a downward current of air. The existing trap was large, heavy, and had to be hooked up to an electric outlet in order to operate it. Barney designed and built a smaller cylindrical trap of plastic materials and used dry batteries to operate the light and a motor that spins a toy propeller. The final product was not impressive in appearance, but extensive field tests have shown that it is promising, improvable, and usable everywhere.

Then Barney turned his attention to the rodent bait station, a heavy metal housing for poison bait attractive to rats. After these metal containers are used they have to be cleaned before they can be used again. Barney went to work with scissors and cardboard and cut out a pattern that could be folded into the shape of a very small dog house. The rat either enters the box to feed on the bait or it feeds with its head in the entrance. When such a simple inexpensive device becomes contaminated and is no longer attractive, it is simply destroyed by burning. Again, field tests have demonstrated that this carboard shelter is just as effective as the old sheet metal containers.

I shall not mention everything that Barney has done along this line, but I do want to describe his centrifugal sprayer, which uses a principle not hitherto employed in commercial sprayers. The spray liquid is drawn or pumped through the hollow shaft of a motor and is thrown out through plastic tubing attached at right angles to the end of the rotating shaft. This sprayer is in process of development and will be designed so that the whole unit on a pedestal can be clamped to the rear end of an army vehicle and will deliver a mist of concentrated spray that will be carried away from the vehicle as it moves forward. Weight is reduced to a minimum and the operation is relatively quiet.

Although this device is easily transportable and can be attached to any military vehicle for use wherever the vehicle can move, Barney sensed the need for something even simpler that can be carried by the individual soldier and used by him not only to produce a space spray for control of flying insects, such as mosquitoes, but also for the control of insects for which a so-called residual spray is required. In response to this need Barney created what I like to call the Whippersnapper, of the most elegant simplicity. The soldier carries in his hand or suspended from his shoulder a plastic bottle or bag containing a liquid insecticide. A long flexible plastic tube from container ends in a tiny brass nozzle. To deliver spray that will drift down wind all the soldier has to do is whip the plastic tube around by hand, as a cowboy whirls a rope, but in a vertical plane. It is helpful to have an enlargement as a handle about a third of the way along the tube. It occurred to Barney that this enlargement might serve another purpose. If one wants to spray, it gives simply a convenient hand hold on the tube. But if one wishes to deposit on a surface a layer of insecticide by means of a coarse spray, the plastic holder then becomes a pump which when squeezed repeatedly forces a coarse spray out of the nozzle. This pump has one-way valves at either end and is used in hospitals for pumping blood. The Whippersnapper, Barney tells me, has attracted most favorable attention from military officers.

Barney could have concentrated on pest control equipment to the exclusion of everything else going on around him, but he could not help being aware of the need for extension of his "light weight line" into the field of desalination and water purification, and he was encouraged to spend part of his time along these lines. The result is that he has moved into a very important and active field of research headed in Government by the Office of Saline Waters of the U. S. Department of the Interior.

He started his work on the assumption that if the evaporating surface was brought very close to the condensing surface the efficiency of distillation would be improved. He has not been concerned at all with stills as we know them in a chemical laboratory but rather with the obtaining of a condensate on a surface at a lower temperature than that of the evaporating surface, which he separates from the condensing surface by means of a water-repelling plastic window

screen. A rotating device on this principle was built and worked very well, but again Barney thought that it was more important from the military point of view to work first on a device for the use of individual soldiers, sailors, or airmen than to develop a machine for the production of fresh water in large quantities from salt water. Therefore I shall describe here only a very simple arrangement for the production of small quantities of fresh water from seawater. Let us suppose that men are adrift at sea under a rainless sky without drinking water. Each man could spend his time getting drinking water from Barney's solar still, which looks superficially like a file of correspondence having a minimum of five sheets. The top sheet consists of black plastic film; the second, a piece of paper toweling or cloth; the third, a water-repellent screen, or netting; the fourth, a piece of aluminum foil; and the fifth a cloth backing for the foil to cool it by evaporation of water from the cloth. The castaway dips all these sheets in the ocean, thus saturating the paper toweling and cloth with sea water. Then he drains off excess water, wipes off the aluminum foil with his shirt, and exposes the top black surface to the sun. In a little while he opens these layers, exposing the aluminum surface upon which there will be a condensate of fresh water. This he can mop up with a sponge to be provided in the kit and obtain water from the sponge.

Barney finds that the efficiency of this device can be multiplied by replication of layers two, three, and four mentioned above, and I myself saw the operation of a multilayered pile in which the three intermediate layers were repeated six times. On each of the aluminum layers a condensate was formed, diminishing in quantity as one proceeds from the top aluminum surface to the layers below. This survival still can be operated when the sun is not shining or at night merely by sitting on the black surface, thus providing a temperature differential between the top surface warmed by the body and the aluminum surfaces cooled by the sea water. Thus, as Barney expresses it, the output of the still will be proportional to the human effort put into it, and certainly a man who wants nothing so much as water will be glad to put a lot of effort into it.

There is in the embryo stage another solar still that will require little attention. It will be a variation of the so-called greenhouse still. A bell jar without a knob on top will be covered by an aluminum layer and the aluminum in turn by a black cloth or wick, which will pick up saline water from a circular trough below. This wet surface will be covered by a larger transparent bell jar the inside surface of which will be close to but not in contact with the wick. The double bell will be placed in direct sunlight, which will shine through the outer jar and will heat the cloth and aluminum under it. The heat will be conducted by the aluminum around to the shady side of the bell. Then there will be a considerable temperature difference between the warm wet surface and the cooler glass jar surrounding it. Most of the condensate will form on the inside of the glass jar away from the sun. Because of its shape, this device need not be oriented toward the sun, but will work unattended wherever it is exposed to sunshine. Suitable arrangements will be made, of course, to collect the condensate.

All the above-mentioned developments have been protected by patent applications.

It was very interesting to me to see how Barney has reduced to practice the ideas that have come to him in such profusion. He has help, of course, but at first in the heat of imagination he works with his own hands and uses whatever he can and that he might adapt to his purpose. Thus his prototypes look very crude indeed, but in the end the armed services and the civilian population will benefit greatly by his work.

SCIENCE AND DEVELOPMENT

A newly developed soil psychrometer will aid scientists in accurately measuring the relative humidity of air in the soil. The new instrument was designed by Dr. Lorenzo A. Richards and Dr. Gen Ogata at the U.S. Department of Agriculture Salinity Laboratory, Riverside, California. It is capable of measuring differences in relative humidity as small as 1/2000 of 1 percent. It will make possible quantitative measurements of soil moisture needed to determine the factors influencing availability of water to plants. Research has shown that most plants will grow if the relative humidity of air in the soil is between 98.91 and 99.83 percent, but not at 98.90 percent, although at this lower humidity most plants will remain alive.

Bootlegging of amphetamine drugs is a menace to safety on the Nation's highways, the Food and Drug Administration has asserted in a special report on its efforts to curb illegal sales of the stimulant pills to truck drivers and motorists. The FDA crackdown was launched last fall when it had more than 200 cases under investigation. Since that time, 85 criminal prosecutions have been completed; 31 additional prosecutions have been instituted and are now pending in Federal district courts; and in eight separate actions, 1,837,000 tablets and capsules of amphetamine drugs were seized. Defendants in the actions involved truck stop operators, grocers, and other peddlers; retail druggists who sold without prescription or refilled without authorization; and licensed practitioners who dispensed the drugs without having established a bona fide doctor-patient relationship.